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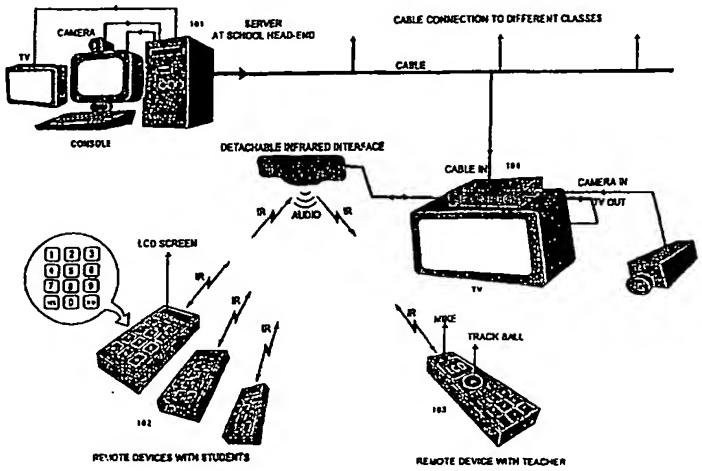

(57) Abstract

A cable head–end based interactive media education system consists of a centralized server (101) in a school which is connected via a cable–TV network to a set–top box (104) in each class–room which in turn is connected to a TV. The teacher in a class can now use a wireless remote device (103), which communicates with the set–top box (104) in order to present a lesson on the TV. The lesson can have intermittent quiz questions, which can be answered immediately by the students using their wireless remote devices (102). The continuous responses of the students as well as those for the quizzes, can be evaluated by the server (101) and the results can be shown on the TV screen and stored for evaluation. Apart from student evaluations, this facilitates evaluation of the teachers and even the lesson plans. A microphone builtin the remote device with the teachers allows capturing of the voice explanations along with the visuals on the screens – these can be replayed back for reviewing the lesson. A TV camera attached to the set–top box (104) is used for facilitating subjective evaluation of an individual's presentation/creation by the entire class and the teacher.

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TITLE OF INVENTION

A CABLE HEAD-END BASED INTERACTIVE MEDIA EDUCATION SYSTEM.

FIELD OF INVENTION

INTERACTIVE NETWORK SYSTEM.

The conventional education system, based on the ubiquitous back-board has been beset with many problems, for which various technological solutions are being sought. However, unless these technology solutions are made very affordable, they will not be available to most of the schools, specially those in developing countries. Further technology by itself cannot do anything unless it is directed towards eradicating the malaise of the traditional education system.

Today there is no rampant confusion regarding the role of PCs and CD-ROMs in schools which is supposed to modernize teaching. It should be kept in mind that a PC with CD-ROM titles belongs to the library, where it complements the existing books and encyclopaedias. PCs are bringing about precious title difference in the day-to-day teaching of lessons in the class-room; the traditional tedium continues.

The malaise of the traditional education system starts with the delivery of the lessons itself in the class rooms. Here the typical scenario consists of a teacher writing on the black board with back towards the class, and the students dutifully copying the notes. Alternatively the teacher would be lecturing to the class, and the students would be busy jotting down each word. In exceptional cases where the lecture notes get distributed separately, the verbal lecture of the teacher may still fail to create the right images in the mind of the students. As a result, only rote learning remains possible.

The traditional teaching is unmindful of the actual absorption of the contents in the mind of the students. By now setting the right place of the lessons according to the understanding abilities of the students, the result is indigestion. Even if the place is suitable for most of the class, the traditional teaching system is unable to identify students who are facing difficulty with certain portions of lessons, and take immediate corrective actions. This creates a distaste in the mind of the student who are lagging behind, and their only hope is in desperate cramming just before the examinations.

In the traditional teaching system, a teacher gets overloaded with correction of assignments and exam papers. The sheer drudgery

of this process, makes it easy for biases to creep in. Furthermore this leaves the teacher with title energy or time to actually plan out proper presentations of lessons in the class.

The students even more in the traditional education system. Their day starts with having to bother about what note-books and books they have to stuff in their bags. The day is spent in taking down notes verbatim, with the actual understanding postponed for a later time. Since justice to the home work can't be done based on the ill-understood material in the class – the attempt becomes mechanical, based on rote knowledge. Just before the exams, night-mares become a routine. This certainly doesn't foster learning.

The school management itself has a harrowing time in the traditional education system. It cannot monitor the qulity of teaching in the class. It is many times not clear that poor results of a class are due to the teachers, curriculum or the student themselves. The student evaluations are effected by teacher biases, specially in subjects such as arts, language, literature, etc.

The traditional education system rather than empowering each student according to his interests and abilities, ends up unfairly judging and handicapping the students due to the faults of the system itself.

The system envisaged according to the present invention has been developed to eliminate much of the mentioned drawbacks and malaise of the traditional educational system. The hardware, components and inter-connectivity has been devised such that apart from meeting these goals, the overall solution remains affordable to most of the schools.

Cost-effectiveness is ensured by choosing a centralized server based approach, with the interactive lessons being delivered through a low-cost cable-TV network connecting to TVs in each classrooms. The repetitive one-time and recurring cost in each class-room is minimized by centralizing all the computations in the server, and leaving only the interface functions in the class-room devices. The teachers and students use wireless devices for interacting with a set-top device attached to the cable which shows the lessons on the TV. For further strengthening the interaction, provision is made for a TV camera to be attached to the set-top device.

The hardware and network of the invention, is sufficient to enable creation of appropriate programs to take away most of the problems and malaise of the traditional education system. It enables creation of multimedia lessons which can facilitate intuitive understanding. The invention provides a holistic solution for supplementing the entire education system and evaluating the students, teachers and the curriculum itself continuously.

PRIOR STATE OF THE ART

The traditional education system, uses various modern tools on an ad-hoc basis for supplementing education, such as: video-tapes, slide-shows, 16mm projectors, transparency projectors and PCs with presentation software.

Lately, PCs with multimedia CDs are being acquired by well-to-do schools. Their role is more appropriate for a computer lab or a library. The use of a CD by a student on a PC, is analagous to use of an encyclopedia in a library - both are individual pursuits.

Educationists and Researchers have been experimenting with Computer Based Training (CBT). The aim is to minimize the dependancy on a teacher and allowing a person to teach himself in a systematic manner. This technique has been effective for corporate training or professional training in specialized topics. It has been least effective in schools and colleges, since it could not generate motivation or the discipline necessary for learning.

Several colleges and universities have devised computer based examinations, which allow students to answer, sitting at different terminals. The high-cost associated with providing a terminal to every student for answering simultaneously has been a serious deterrent in the practical use of this alternative.

The fate of educational programmes broadcast through satellite channels, has been worse, due to lack of interactivity. Introducing

telephonic feedback from students has not been effective, due to the costs of long-distance calls and the limitation in interaction.

The potential of interactive distance education has been opened up by the ubiquitous Internet. This, however, remains more suited for professionals enhancing their knowledge. It is not suited to imparting knowledge to the uninitiated, non-motivated students.

A class-room and a school still remains an environment conducive for learning. This is due to the inter-personal dynamics at play which include peer-pressure, competition, co-operation, team-work, eye-contact, shared interests and self-esteem at stake. The school also fosters the development of personality and social skills. Thus distance education is effective only in later ages, when a person is motivated and mature enough to learn on his own.

ADVANTAGES OF THE INVENTION

The invention builds up on the success achieved by the TV medium in imparting intuitive understanding to children and adults, through its effective multimedia presentation. A lesson plan in geography, history, science etc. can be more effective if it is accompanied by sound, images and video-clips rather than mere verbal description.

A large TV screen in a class-room allows each student to focus at a central place, much like the effect of the black-board. Now, however, the teacher can conduct the multimedia lessons with a wireless device, while facing the class (and not the blackboard).

Absence of a PC in a class-room not only takes away the associated hardware and software problems, but also prevents all the software brand names from entrenching themselves in the minds of the students, and the general purpose software distracting them. With the system described in the invention, computer-based hardware is centralized only in the server. The devices required in a class are of dedicated nature and like the TV are virtually maintenance free. Thus one part-time computer-savvy person operating the server, should be sufficient for the entire school.

Unlike, software such as CBT, which aim to replace the teacher, the invention serves to strengthen the hands of the teacher, with the wireless device which allows better delivery of the lesson. Although, there would not be reduced dependency on the caliber of the teacher, the teacher can now conduct a lesson in a much better way. The lessons also now can be adapted from those prepared by the best in the field.

The invention facilitates a pro-active attitude of the entire class, due to the continuous feedback required from each student, during the lesson. Each student would be responsive, since he knows that the teacher can find out about his understanding based on the responses given via his wireless device during the lesson. The invention facilitates a pro-active role of the teacher, since the performance of the entire class is indicative of the teacher's role.

OBJECTIVES OF THE INVENTION

The system described in the invention brings about a new era in education by taking away many of the bottle-necks and tedium in traditional education system, while enabling higher efficiency of students and teacher as outlined below.

- To provide an economical and scaleable system, which can be deployed in almost every school and can be even afforded by many impoverished schools. The system itself would enhance the earning prospects of the school, which can be plowed back for further enriching the system.

- To provide real economies through pooling of software, computing and video resources at the central server, and keeping the incremental cost per class-room at the minimal. Further ensuring that upgradation requirements are primarily confined to the Server, and don't affect each class-room.

- To allow each computational node in the central server to cater to several classes, thereby reducing the cost.

- To eliminate all the hassles and extra cost associated with maintenance of computer-based systems in every class.

- To enable the evolution of curricula and an evaluation system that rewards actual understanding rather than rote knowledge.

- To enable a teacher to author an interactive multimedia enriched lesson plan which can be enhanced, improvised and reused by other teachers.

- To allow evolution of new lesson plans based on the best of the existing lesson plans prepared by educationists world-wide.

- To reduce the need for taking down notes in the classes, by allowing lesson-plans to be distributed before-hand in printed form. This would allow the student to concentrate on the lesson and be more pro-active in the class.

- To allow generation of home assignment printouts for each students with randomized questions to prevent copying, and to allow automatic evaluation of the answers in the subsequent class.

- To allow automatic assessment of student's assimilation of the lesson plan through continuous feedback as well as responses to intermittent quizzes.

- To allow automatic generation of an exam questionnaire, based on specified range of lessons.

- To allow sequential assessment of subjective material such as art, poetry, elocution, presentation etc., through collective inputs received from the teacher and the class, thus suppressing biases.

- To allow students to have better view of papers, small objects, and experiments by providing a close-up of the same on the TV screen, using a video capture device.

- To allow personality development of each student by allowing him to view himself on the TV screen during a presentation through a TV camera and obtaining performance rating from other students and the teacher.

- To reduce the tedium of the teachers for correcting assignments and test papers, thereby allowing them to concentrate on preparation of the next lesson plan and improvement of the past ones..

- To identify the students who are lagging behind the class and providing special attention to them through remedial lesson plans.

- To allow a lesson plan presented in a class to be automatically annotated by the spoken exposition of the teacher at selected stages, enabling proper lesson reviews subsequently. Also allowing the play-back speed of the voice to be regulated by the student.

- To allow the lesson plan to be automatically annotated by the Comprehension Statistics on each screen, giving important feedback to the teacher and students.

- To allow evaluation of a lesson plan, so that it can be improved later, based on the Comprehension Statistics annotated with it.

- To provide teachers statistics regarding performances of other classes for the same lesson, allowing them to set the expectation for their own class.

- To provide detailed statistical analysis of the performance of students, teachers and lesson plans vis-a-vis other schools, for the management

and parents. The same statistics can be used for vocational guidance and specialized training.

- To allow the lessons to be reviewed at home using computers with internet/modem connection or cable-TV with servers at the cable head-end.

SUMMARY OF THE INVENTION

The present invention makes possible an economical system which allows interactive multimedia based education to be imparted in each class while concurrently evaluating the comprehension of the lessons by the students. A cable-TV network in the school connects a central server to a set-top box attached to a TV in each class-room.

The server consists of multiple processors on a fast ethernet, or a network backbone. The master processor is also connected to a console as well as external network interfaces such as the internet. Each processor interfaces to multiple display cards for generating separate multimedia lesson channels on the cableTV network. The video outputs of the display cards are modulated and mixed on the cable network, whereby the set-top boxes in each class can tune in to their respective channels. The server can, depending on the computational requirements, dynamically change the lesson channels assigned to each processor. The master processor on the server can communicate in a digital manner with all the set-top boxes for controlling them and getting their status and data. This communication occurs through the cable,

whereby a diplex filter is used for carving the reverse path for the signals coming from the set-top boxes to the server.

The set-top boxes become quite robust and cost-effective as the multimedia display generation activity is entirely handled by the server. A set-top box in a class now is responsible for polling all the remote devices with the teachers and students and communicating the same to the server. This polling is done through a detachable infrared input/output interface, whereby optimal coverage of the class can be ensured.

The battery-powered teacher remote device is used for controlling the multimedia presentation by the teacher, as well as for conducting quiz sessions for the students. For this purpose the teacher remote has special browsing keys apart from the numeric keys. The teacher remote has a track-ball which is used as a pointing device on the TV screen, allowing zooming of the screen around any point. The teacher remote also contains an FM microphone, whereby the teacher can speak into it, and be heard on a Speaker connected to the set-top box. In addition, the set-top box can digitize the voice of the teacher and have it sent to the server for being recorded: this is helpful for annotating the lessons with the commentary of the teacher for later review.

The battery-powered student remote devices are used for gathering the feedback from the students using the infrared interface. The students answer multiple choice quizzes displayed on the TV screen, using the numeric keys on their remote devices. They can also indicate their comprehension of each displayed page of the lesson by pressing the

"Yes" key or the "No" key on their remote device. Accordingly a "comprehension bar" is displayed on the screen, which indicates the number of students who have understood and those who have not.

The set-top box provides a video-input for a TV camera which is used in the class for showing a close-up of an object on the large TV screen. It can be also used for close-up of a student during his presentation. The output of the TV camera can be modulated by the set-top box on the reverse channel of the cable whereby it can be viewed on a TV connected at the server end.

BRIEF DESCRIPTION OF THE DRAWINGS

Accompanying drawings which are incorporated into and constitute a part of the description of the invention, illustrate embodiments of the invention and serve to explain the principles of the invention. It is to be understood, however, that the drawings are designed for purposes of illustration only, and not as a definition of the limits of the invention of which reference should be made to the claims appearing at the end of the description.

FIG.1 is a diagrammatic view of one embodiment of the present invention showing how a server at the head-end of a school is connected via a cable TV network to the set-top boxes in each classroom which in turn control the wireless remote devices used by the teachers and students.

FIG. 2 illustrates in the form of blocks the construction of one embodiment of the server as described in the present invention.

FIG. 3 illustrates in the form of blocks the construction of one embodiment of the set-top box with detachable infrared interface as described in the present invention.

FIG. 4 illustrates in the form of blocks the construction of one embodiment of the battery-powered remote devices used by teacher and the students. The devices used by the students may not have the feature of the built-in microphone.

FIG 5 illustrates another embodiment of the invention, wherein a conventional network server is used on a LAN such as ethernet which connects to PCs in each classrooms. The PC/diskless-PC is connected to the set-top box which has the infrared interfaces . The altered functionality of the settop box is described in FIG 6. The functionality of the remote devices remains the same as described in FIG. 4.

FIG 6 illustrates another embodiment of the set-top box, which is used along with the embodiment of the invention described in FIG 5. It includes the infrared interface and communicates with the PC/diskless PC using serial communication lines.

DETAILED DESCRIPTION OF THE INVENTION

In details now and referring to the drawings, FIG. 1 shows in a diagrammatic form, one embodiment of the present invention. 101 is the server at the cable head-end of the school which is connected to the cable-TV network in the school. 101 is also connected to an operator console and a TV camera. 104 is the set-top box which is connected to the cable TV network, a TV and a video camera. 104 also has a

detachable extension with infrared input/output interfaces and a loud-speaker. 103 is a battery-operated remote device for the teacher with infrared input/output interfaces and a wireless microphone interface. 102 are one or more battery-operated remote devices for students each having an infrared interface.

FIG 2. shows one embodiment of the server as described in the invention. 201 is the master processor motherboard, which connects on the ethernet backbone 215. The backbone 215, can indeed be replaced by any other fast back-bone bus for connecting processor boards. 201 has general communication interfaces such as internet and telephone interfaces. 201 handles the server's operator console. 201 also interfaces to a communication module, 202, for the purpose of sending and receiving data from the set-top boxes in each class. 202 sends data to a RF modulator, 203, and receives data from a RF demodulator 204. 205 is a diplex filter connected to the cable-TV cable which send the RF signals from 203 on the cable, and sends the reverse path RF signals from the cable to 204. 207 is a processor motherboard connected to the ethernet backbone, 15. There can be many more processor motherboards on the backbone 15, as indicated in 206 and 214. Processor motherboard 207, is connected to the display card 209. 207 can be connected to many more display cards as indicated in 208 and 213. The demux, 212, is addressed by 207 for controlling selection of display cards 208, 209 and 213. 210 is a RF modulator which takes a video output from 209 and gives an RF output to mixer in 211. The mixer, 211, also can take RF inputs from video players as in 216 and

video cameras as in 217. The mixer 211, generates an RF output for the cable TV cable.

FIG 3. shows an embodiment of the set-top box as described in the invention. 309 is an embedded microprocessor, which interfaces to a RAM, 310, which stores general data and speech data. 309 interfaces to a FLASH ROM, 311 which stores the program and configuration data. 306 is an IR (infrared) input device which gives a digital signal to the microprocessor 309. 307 is an IR output device which takes a digital signal from the microprocessor 309. The microprocessor communicates with the remote devices using the infrared input/output interfaces of 306 and 307, alternatively the communication could be done using RF input/output. 313 is a RF demodulator which receives RF signals from a diplex filter 316. The diplex filter 316 is connected to a cable-TV cable and is controlled by the microprocessor 309. 314 is a RF modulator which takes a digital signal from the microprocessor 309 and gives an RF output to the diplex filter 316 which is sent on the reverse path of the cable to the server. 315 is a RF modulator which takes an audio/video input from a TV camera and inserts an RF signal into the cable. 312 is a video tuner connected to the diplex filter 316, which can give an audio/video signal for a TV under control of the microprocessor 309. 301 is a FM antenna connected to a FM demodulator 302 which gives an audio signal. The audio signal is fed into an amplifier of 303 which after amplification is sent to a loud-speaker 305. The audio signal is also given to an A/D convertor 304 and the digitized output is given to the microprocessor 309. The loud-speaker 305 and infrared interfaces 306 and 307 are part of a physically detachable unit, which can be kept apart

using long interconnecting wires. The physically detachable unit can be positioned at an appropriate location in the class for optimal infrared interface polling of all the student remote devices.

In FIG 4, shows an embodiment of the remote device as described in the invention. 407 is a microcontroller which generates display on an LCD display 409. This display of 409 can be alternatively an economical LED one. 407 takes inputs from key-switches of 408. The key-switches of 408 consist of atleast 10 numeric keys, a "Yes" key and a "No" key. In addition for teacher remote device the key-switches of 408 would contain additional keys needed for browsing and controlling the set-top box. The track-ball shown in 410 gives its digital output to the microcontroller 407. 410 is only present in the teacher remote devices; 410 can be substituted by other pointing devices such as a joy-stick. The microcontroller, 407, can also take inputs from a PC-keyboard interface of 406, which allows an external PC compatible keyboard to be used for full aiphanumeric text input. 404 is an infrared input device which gives a digital signal to the microcontroller 407. 405 is an infrared output device which takes a digital signal from the microcontroller 407. The infrared devices of 404 and 405 are used for communicating with the set-top box, alternatively instead of infrared RF communication devices could be used. The blocks as shown in 401, 402, and 403 are only for use by a teacher remote device and are not needed in the devices with the students. 401 is a condensor microphone whose audio output is given to the FM modulator as in 403. An antenna, 402, is used for broadcasting the FM signals from 403 under control of the microprocessor 407.

FIG. 5 shows in a diagrammatic form another embodiment of the present invention. 501 is the network server of the school which is connected to the LAN in the school. 501 is also connected to an operator console and a TV camera. 505 is a PC or a diskless PC in a class-room which is connected to the LAN. 505 generates video-output and an audio-output for a TV 506. 505 also connects to a console 507. 505 also takes a video input from a TV camera 508. 504 is the set-top box with integrated infrared interface and a loud-speaker, which communicates with 505 using a serial communication interface.503 is a battery-operated remote device for the teacher with infrared input/output interfaces and a wireless microphone interface. 502 are one or more battery-operated remote devices for students each having an infrared interface.

FIG 6. shows in a block form another embodiment of the set-top box as described in FIG 3. Here only the difference in functionality are described. Modules 312, 313, 314, 315 and 316 are not present in this embodiment. Instead the microprocessor 609, interfaces with a serial communication interface 617, for communicating with the PC/diskless PC as described in FIG 5. The set-top box is integrated with the infrared interfaces 606, 607 and the loud-speaker 605. The set-top box with the integrated infrared interface and loudspeaker, is now positioned at an appropriate place in the class-room for optimal coverage.

While some embodiments of the present invention have been described and illustrated, it is to be understood that many changes, modifications and variations could be made without departing from the scope or the

spirit of the invention. Many of the blocks in the Figures, are shown separately for clarity and description purpose, although in practice many of them may get combined together in the same device. According to the prevailing state-of-art in electronics, it would be possible to combine lot of these blocks into a separate custom ASICs, to achieve a higher degree of compaction. All these applications of the state-of-art, would in no way affect the basic principle behind the devices described in this invention.

I Claim :

1. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room through wireless remote devices used by teachers and the students, includes a server communicating with a cable T.V. network; a T.V. set in each class room; a set of top box as herein described, in each class room connected between the said cable T.V. network and the T.V. sets, and communicating with a plurality of remote devices, each device having display and key pads; the said key pads of remote devices with the teachers being provided with browsing keys and a pointing device, such as a track ball; and the said key pads of remote devices with the students being provided with numeric keys and two keys for indicating "yes" and/or "no" response.

2. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claim 1 wherein the said server allows each processor within it to cater to several display cards, each card generating a multi-media display for a separate class.

3. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claims 1 and 2 wherein the said server reassign different classes to each processor to optimise the display speed requirements.

4. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claims 2 and 3 wherein the said set-top box is adapted to be connected to video output devices, the signals of which are displayed on the attached T.V. which may be broadcast on the cable T.V. network.

5. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claims 2 and 3 wherein the said remote devices with teachers consists of a wireless microphone adapted to transmit the voice to the said set-top box, which in turn amplify the sound and send it to a speaker as well as send the digitised sound to the server for storage.

6. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claim 4 wherein the said server may be connected to one or more video output devices, and allows the video signals coming from the video output devices to be sent to the TVs in the selected class rooms.

7. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claim 5 wherein the said set-top box may have at least one detached portion consisting of infrared or wireless interface and the speaker may be positioned at a suitable point for better coverage of the class room.

8. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claims 1 to 7 wherein the said server becomes a conventional network server, the cable network becomes a LAN such as ethernet, and each class room has a PC or a diskless PC interfaced to the set-top box.

9. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in

each class room as claimed in claim 8 wherein the PC/diskless PC, set-top box and the infrared interface may be combined in a single cabinet.

10. A centralised multi-processor server for analog/digital transmission over cable T.V. networks for interactively conducting multi-media enriched lessons in each class room as claimed in claims 1 to 9 may be accessed directly or indirectly through remote computers, set-top boxes and servers through communication networks such as internet and may allow usage of the lessons.

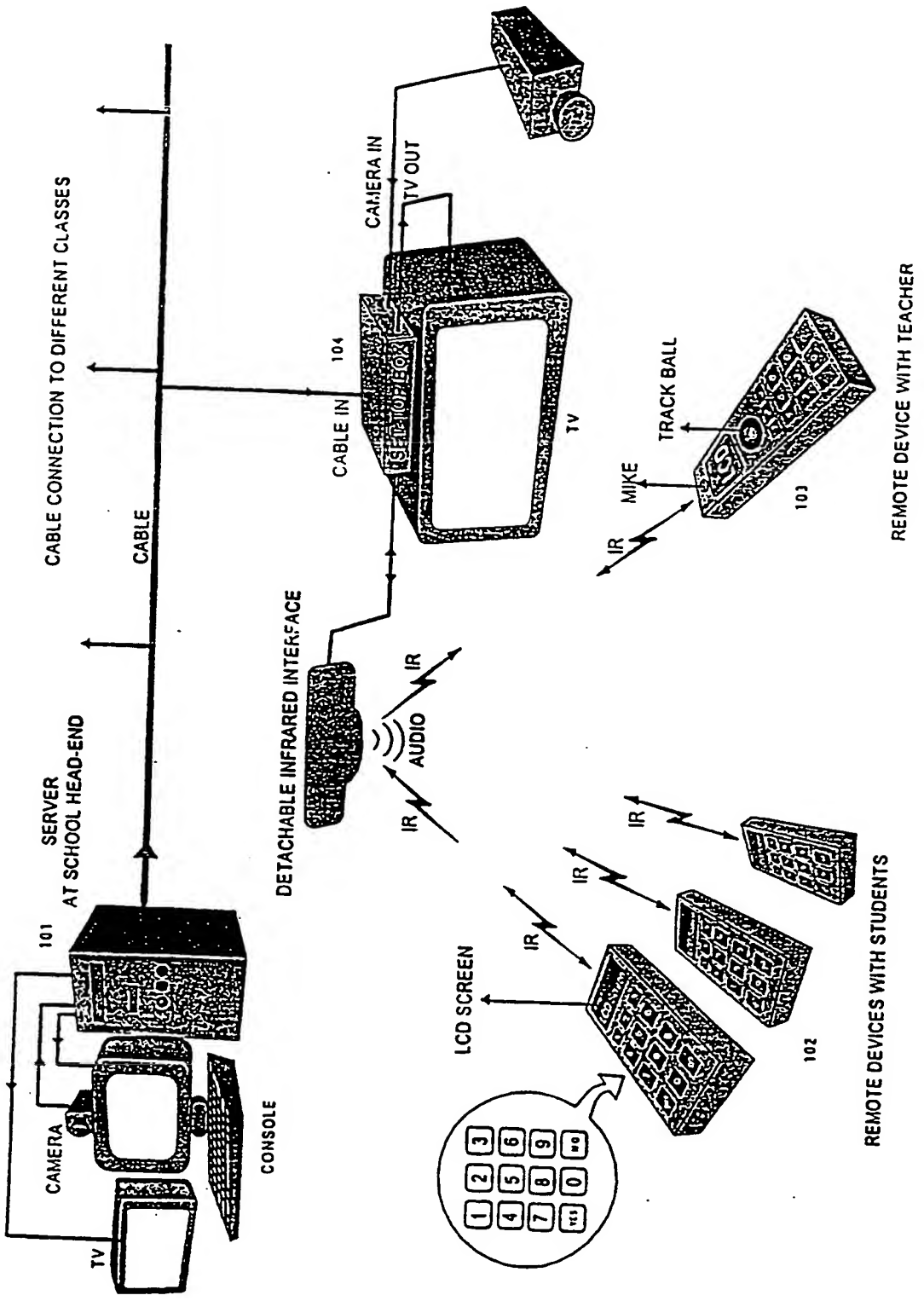
CABLE CONNECTION TO DIFFERENT CLASSES
CABLE
SERVER
AT SCHOOL HEAD-END
101
CAMERA
CONSOLE
TV
DETACHABLE INFRARED INTERFACE
IR
AUDIO
IR
CABLE IN
104
CAMERA IN
TV OUT
TV
IR
MIKE
TRACK BALL
103
REMOTE DEVICE WITH TEACHER
LCD SCREEN
IR
IR
IR
102
REMOTE DEVICES WITH STUDENTS

FIGURE 1

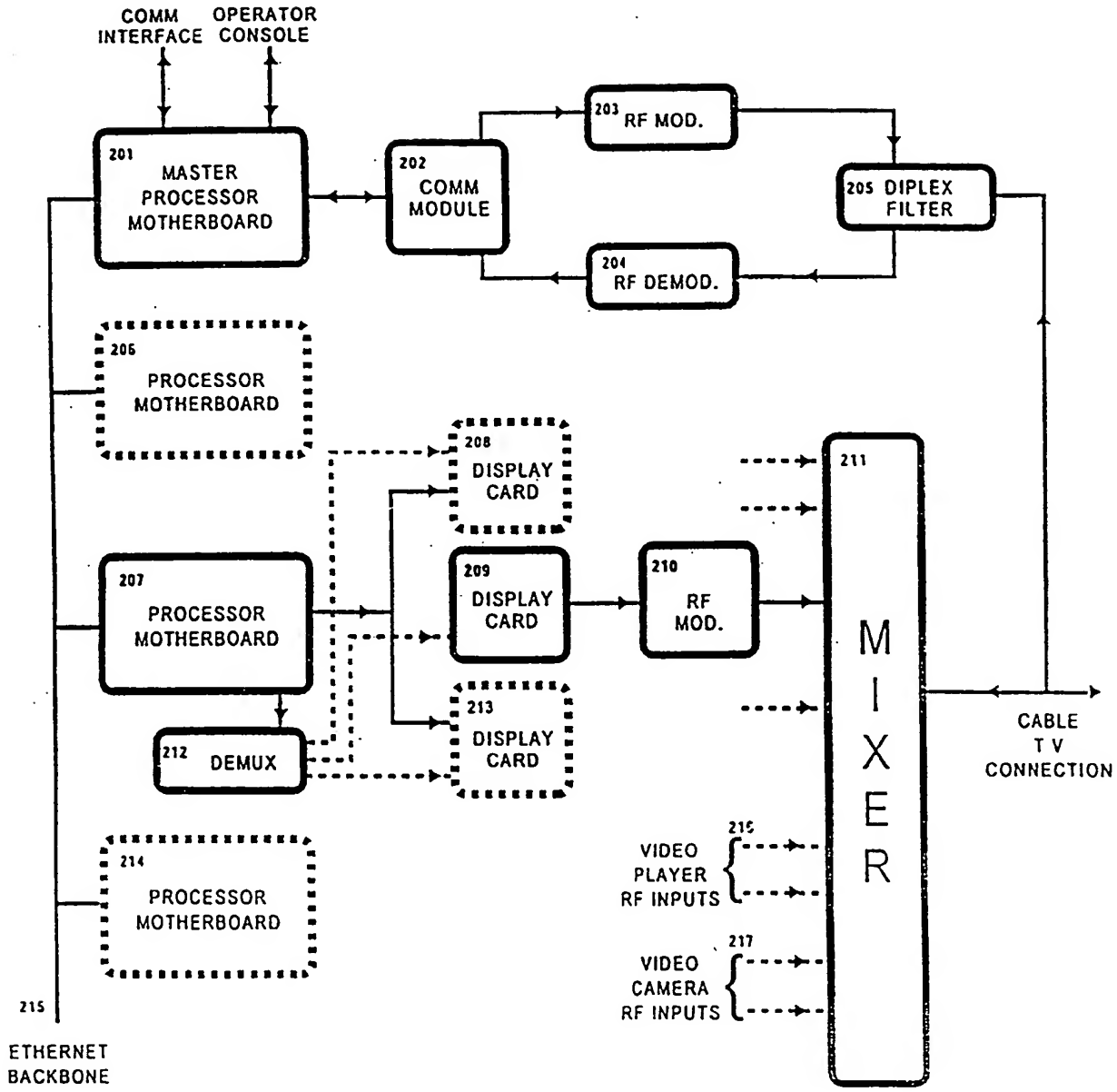
COMM INTERFACE
OPERATOR CONSOLE
201 MASTER PROCESSOR MOTHERBOARD
202 COMM MODULE
203 RF MOD.
204 RF DEMOD.
205 DIPLEX FILTER
206 PROCESSOR MOTHERBOARD
207 PROCESSOR MOTHERBOARD
208 DISPLAY CARD
209 DISPLAY CARD
210 RF MOD.
211 MIXER
212 DEMUX
213 DISPLAY CARD
214 PROCESSOR MOTHERBOARD
215 ETHERNET BACKBONE
216 VIDEO PLAYER RF INPUTS
217 VIDEO CAMERA RF INPUTS
CABLE TV CONNECTION

FIGURE 2

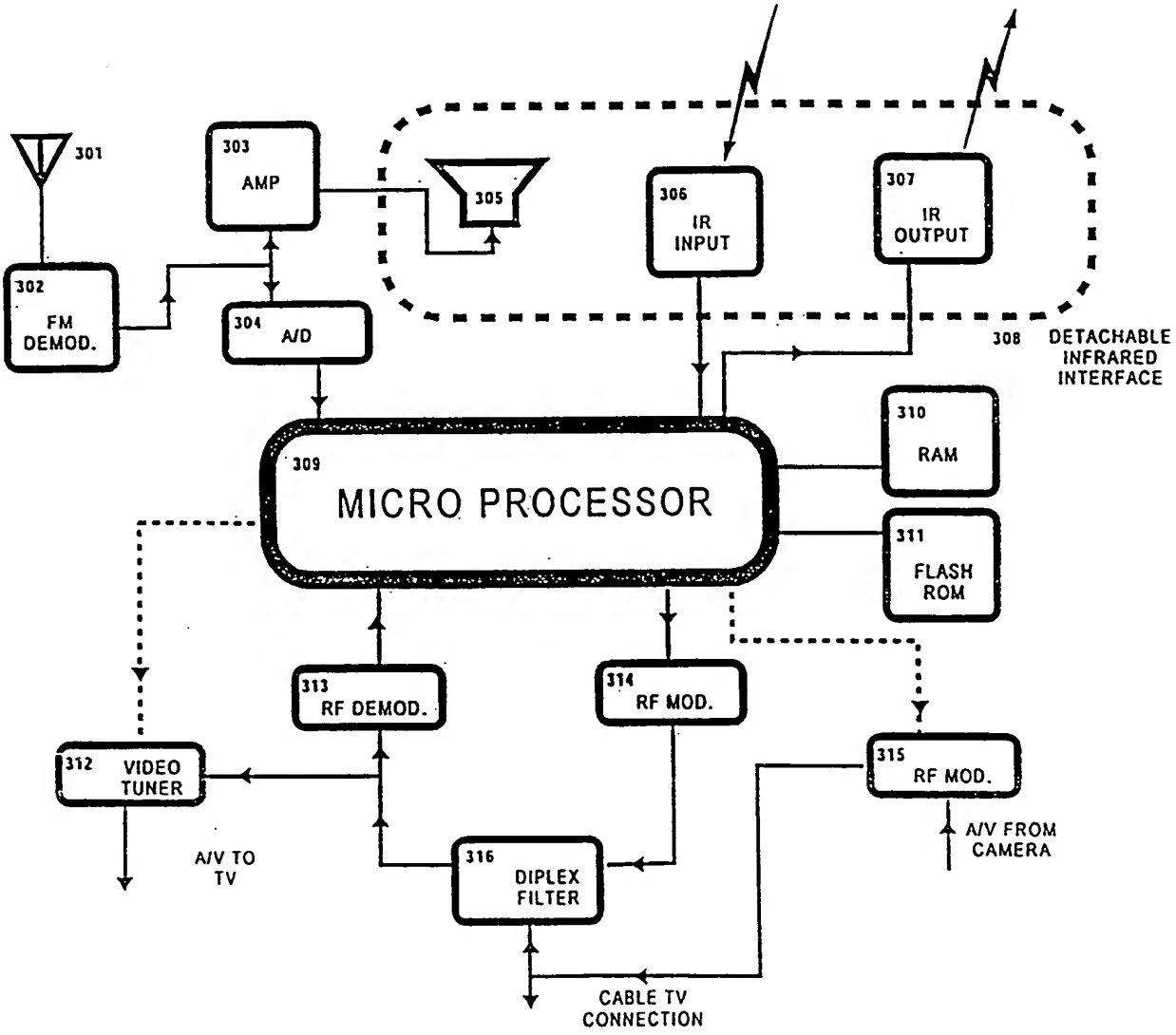
301
303
AMP
305
306
IR
INPUT
307
IR
OUTPUT
302
FM
DEMOD.
304
A/D
308
DETACHABLE
INFRARED
INTERFACE
310
RAM
309
MICRO PROCESSOR
311
FLASH
ROM
313
RF DEMOD.
314
RF MOD.
312
VIDEO
TUNER
315
RF MOD.
A/V TO
TV
316
DIPLEX
FILTER
A/V FROM
CAMERA
CABLE TV
CONNECTION

FIGURE 3

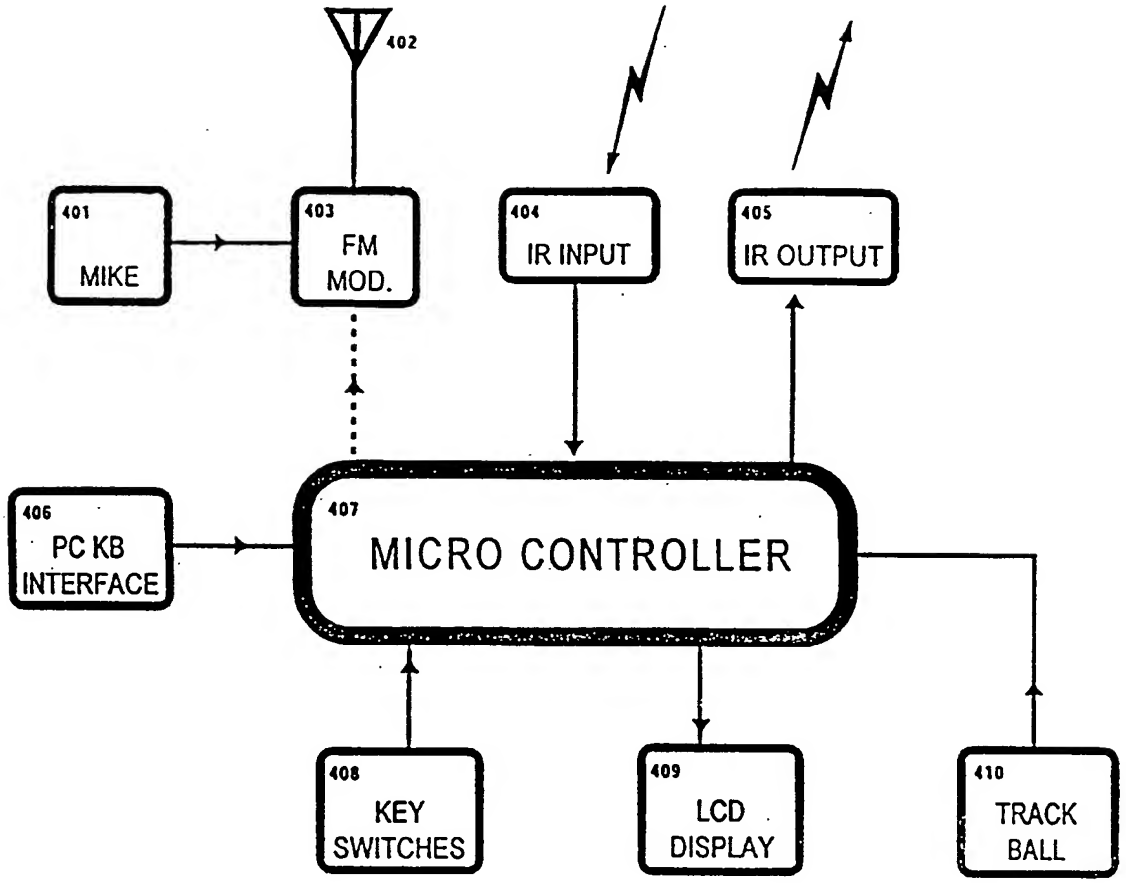
402
401
MIKE
403
FM
MOD.
404
IR INPUT
405
IR OUTPUT
406
PC KB
INTERFACE
407
MICRO CONTROLLER
408
KEY
SWITCHES
409
LCD
DISPLAY
410
TRACK
BALL

FIGURE 4

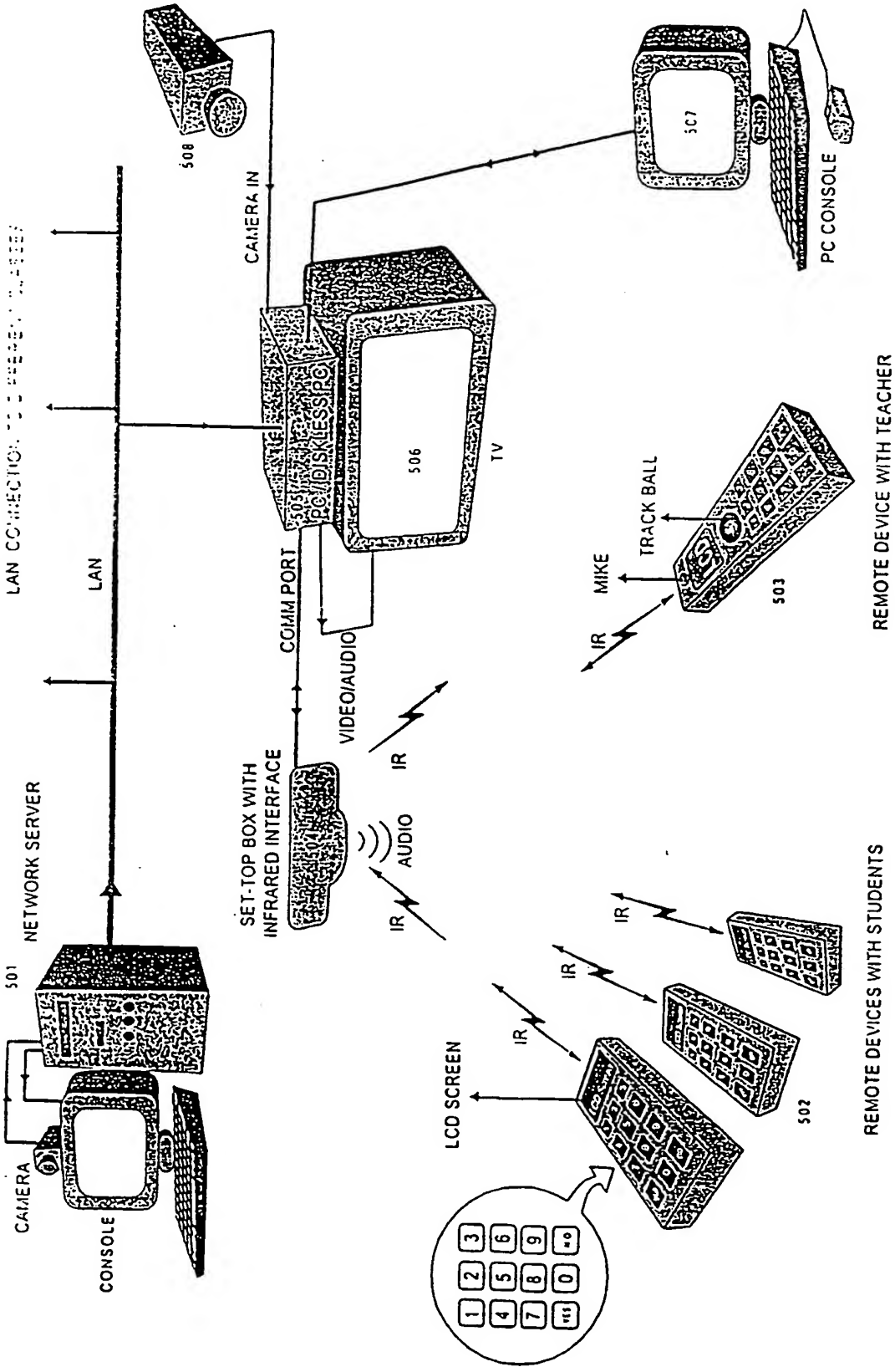
LAN CONNECTION
LAN
NETWORK SERVER
501
CAMERA
CONSOLE
SET-TOP BOX WITH INFRARED INTERFACE
COMM PORT
VIDEO/AUDIO
IR
AUDIO
IR
LCD SCREEN
IR
IR
IR
REMOTE DEVICES WITH STUDENTS
502
IR
MIKE
TRACK BALL
503
REMOTE DEVICE WITH TEACHER
CAMERA IN
508
TV
506
PC CONSOLE
507

FIGURE 5

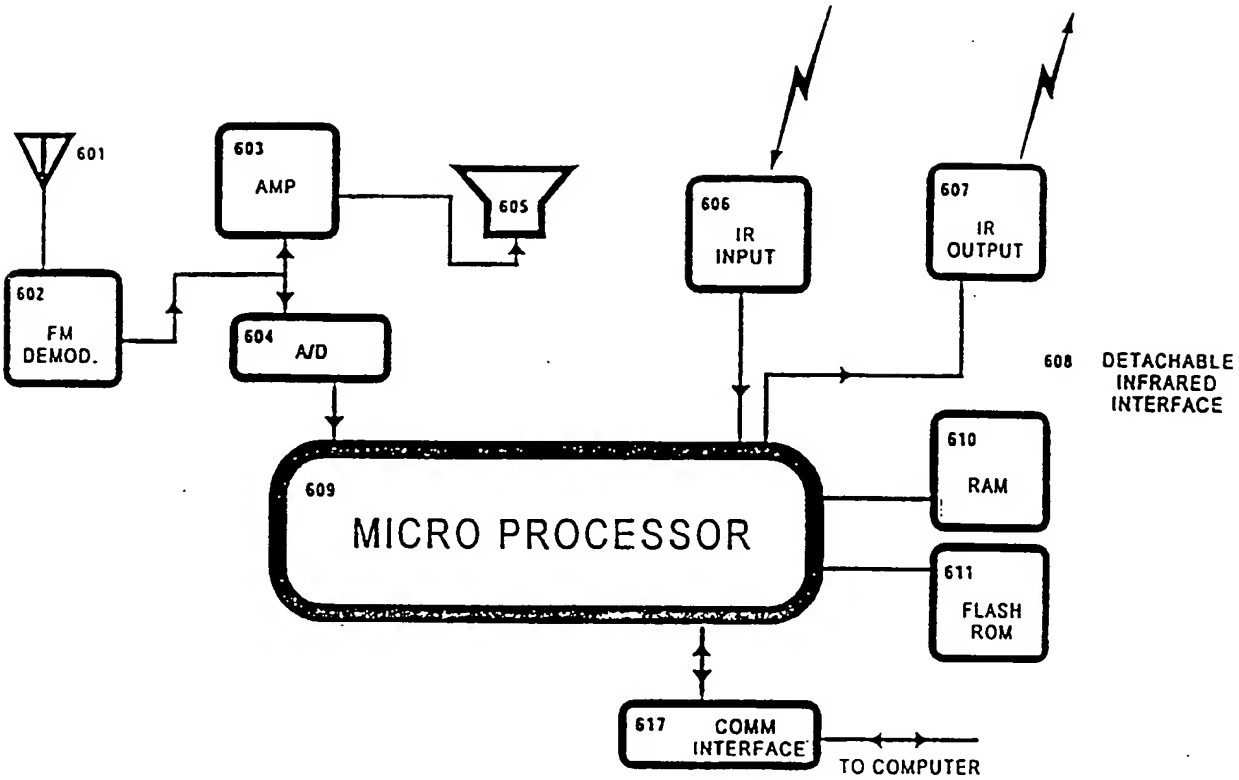
601
603
AMP
605
606
IR
INPUT
607
IR
OUTPUT
602
FM
DEMOD.
604
A/D
608
DETACHABLE
INFRARED
INTERFACE
610
RAM
609
MICRO PROCESSOR
611
FLASH
ROM
617
COMM
INTERFACE
TO COMPUTER

FIGURE 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN 99/00018

A. CLASSIFICATION OF SUBJECT MATTER

IPC[7]: G 09 B 5/08, 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7]: H 04 N 7/15, 7/18; G 09 B 5/06, 5/08, 5/10, 5/14, 7/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5318450 A (CARVER) 07 June 1994 (07.06.94) fig. 1.; claims 1-9.	1-4,6,8
A	WO 93/21618 A1 (LEVIN) 28 October 1993 (28.10.93) claims 1-18	1,6,8

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
„A" document defining the general state of the art which is not considered to be of particular relevance
„E" earlier application or patent but published on or after the international filing date
„L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
„O" document referring to an oral disclosure, use, exhibition or other means
„P" document published prior to the international filing date but later than the priority date claimed
„T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
„X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
„Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 January 2000 (21.01.00)	01 March 2000 (01.03.00)
Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer Fussy Telephone No. 1/53424/328

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/IN 99/00018

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
US	A	5318450	07-06-1994			none	
WO	A1	9321618	28-10-1993	AU	A1	39577/93	18-11-1993
				FR	A1	2690267	22-10-1993
				FR	B1	2690267	25-10-1996